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Technology Acceptance Model Android Puzzle Games Based on Banten Local Culture for Early Childhood Education

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ABSTRAK

Latar belakang pengembangan model multimedia pembelajaran kognitif anak usia dini berbasis android memerlukan analisis penerimaan terhadap permainan puzzle games *pada anak usia dini. Tujuan penelitian untuk menganalisis hasil permainan* puzzle android *masjid kuno Banten terhadap perkembangan kognitif anak usia dini. Metodologi penelitian menggunakan survei terhadap 30 anak usia dini. Pengumpulan data menggunakan observasi dan wawancara. Analisis data dilakukan kualitatif deskriptif. Temuan-temuan hasil penelitian adalah persepsi kegunaan 68%, persepsi kemudahan penggunaan* game puzzle android *67%, dan penerimaan pengguna 88%; hasil uji t diperoleh nilai sig sebesar 0,472 lebih dari 0,05 (0,472 > 0,05), sehingga dapat diperoleh keputusan menerima Ho. Artinya tidak terdapat perbedaan hasil belajar siswa ditinjau dari jenis kelamin; hasil uji t diperoleh nilai sig sebesar 0,507 lebih dari 0,05 (0,472 > 0,05), sehingga dapat diperoleh keputusan menerima Ho. Artinya tidak terdapat perbedaan hasil belajar siswa ditinjau dari rentang usia 5 tahun dan 6 tahun. Kesimpulan penerimaan terhadap permainan* puzzle android *sangat baik dan dapat meningkatkan pembelajaran kognitif anak usia dini usia 5-6 tahun. Implikasi dari hasil penelitian ini adalah permainan* puzzle android *dapat digunakan sebagai media pembelajaran kognitif anak usia 5-6 tahun. Permainan* puzzle Android *berdampak terhadap motivasi belajar anak.*

ABSTRACT

The background to the development of an android-based multimedia model for early childhood cognitive learning requires an analysis of acceptance of puzzle games in early childhood. The aim of the research was to analyze the results of the Banten ancient mosque android puzzle game on the cognitive development of early childhood. The research methodology used a survey of 30 young children. Data collection used observation and interviews. Data analysis was carried out descriptive qualitative. The findings from the research were perceived usefulness 68%, perceived ease of use of Android puzzle games 67%, and user acceptance 88%; The results of the t test obtained a sig value of 0.472 more than 0.05 (0.472 > 0.05), so that the decision to accept Ho could be obtained. This means that there were no differences in student learning outcomes in terms of gender; The results of the t test obtained a sig value of 0.507, more than 0.05 (0.472 > 0.05), so that the decision to accept Ho could be obtained. This means that there was no difference in student learning outcomes in terms of the age range of 5 years and 6 years. The conclusion is that the acceptance of Android puzzle games is very good and can improve the cognitive learning of early childhood children aged 5-6 years. The implication of the results of this study was that the android puzzle game can be used as a cognitive learning medium for children aged 5-6 years. Android puzzle game had an impact on children's learning motivation.

1. INTRODUCTION

Background with a problem that information and communication technology have had many positive impacts in Indonesia. Early childhood education in Indonesia did not use multimedia learning much. During the Covid-19 pandemic and the new normal period, early childhood education in Indonesia used many electronic applications to support the learning process (Neriman Aral, 2012; Sarah Eagle, 2012; Setiaji, 2017). The need for parents and teachers to find and use learning applications is increasing. The existing conditions, learning applications with Banten local cultural themes are still limited. Researchers

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have designed android puzzle games with the theme of local Banten culture (Ofianto & Ningsih, 2022; Venera Gashaj, Laura C.Dapp, 2021). Android puzzle games with the theme of the Banten ancient mosque. Banten ancient mosque as one of the local cultural wisdoms in Banten Province. Banten Province is one of 34 provinces in Indonesia. This Android puzzle game contains puzzle games on the theme of five Banten ancient mosques, namely Kasuyatan mosque, Daarul Falah mosque, Banten Lama mosque, Tanara's Mosque, and Kenari mosque for children's cognitive development. Android puzzle game with the theme of the ancient Banten mosque has been used for learning early childhood cognitive development (Huang et al., 2020; Pratamaa et al., 2023).

The urgency and rationalization of activities research was to investigate the perceived usefulness, ease of use, and attitude of technology users to use android puzzle games for the Banten ancient mosque for cognitive development in early childhood 5-6 aged. Technology acceptance uses the technology acceptance model approach. The model used to measure the level of user acceptance of an information technology. The first TAM model was developed based on the Theory of Reasoned Action (TRA) model to cover gaps that explain the factors that influence or encourage users to use information technology (Ajzen & Madden, 1986; Buabeng-Andoh, 2018). The TAM model is the basis for evaluating user behaviour in using technology that can be presented, namely perceived usefulness, ease of use, and attitude of technology users. The use of technology can improve the performance of a person or organization, as well as make it easier for users to complete their work. The selected publications were analysed according to the acceptance model, the concept used, and the research context. The review finds that many of the previous studies adopted the technology acceptance model (TAM) to evaluate students' intention in using digital games for learning (Buabeng-Andoh, 2018; Kim et al., 2021; Rashid et al., 2021). Android puzzle games for early childhood cognitive development have been implemented in kindergartens. Based on the existing readiness conditions, it is necessary to conduct research to find out how android puzzle game system with the theme Banten ancient mosque has been implemented (Abdullah et al., 2016; Hermawan et al., 2017).

Solution plan that android puzzle games were three-dimensional games designed for educational enrichment, using interactive multimedia technology (Abdullah et al., 2016; Din, 2023). The criteria for puzzle games were: the overall value of a game is centred on the design and length of the game duration; the timer feature, can be used and accessed easily by users; the accuracy of the design of this application must be in accordance with the game model at this stage. Planning, the suitability of the application containing the features and menus required by the user to assist the user's understanding in using the application; the relevance of the application containing content for early childhood so that the interface design displays cheerful colours; the objectivity of the application presents animations and sound effects indicating success or failure (Najib, Fahad Ainun; Nurbiana Dhieni, 2023; Rakimahwati, 2019; Zang Liqin; Wang Mengmeng, 2016). Based on the literature review, the stages of making interactive puzzle games for the puzzle design themes of ancient mosques in Banten are as follows: data collection of image objects and other supporting materials, functional and non-functional problem analysis, modelling, and design, making animation, making coding, testing, evaluating. The puzzle game content is designed through serialization, classification, number construction, time, and place activities (Pratamaa et al., 2023; Sari, N.T and Wasgito, 2020). Computer-based learning has provided emotional experiences, expression, happiness, satisfaction, fear, and the development of early childhood imagination. The design of android puzzle games must meet the criteria for the characteristics of early childhood cognitive development.

The objective of the activity includes the ability to solve simple problems, recognize objects around them, carry out activities using simple technological tools (Bandura, 2012; Kenedi et al., 2019). The use of e-learning provides more flexible learning opportunities without being bound by space and time, makes it easier for children to access learning, adds a variety of cognitive development learning materials, makes learning more open, makes learning meaningful and fun, supports children's independent learning, and increases the effectiveness of learning to increase early childhood cognitive development (Li, 2019; Tegeh et al., 2022). This study aims to analyze the perception of acceptance of the android puzzle games application in early childhood. The research gap was the evidence gap and practical knowledge gap. The research findings from the evidence gap and practical knowledge gap were the originality of this research. The novelty of this research is based on the findings, uniqueness, and analysis of research data. The benefits of this research are to provide a fun learning experience for children about acceptance of the use of the android application puzzle game on the theme of the ancient Banten mosque, increasing all aspects of children's multiple intelligences, and meaningful learning according to the developmental stage.

2. METHODS

The methodology used survey design (Creswell, 2013). Steps in the process of survey research: (1) develop research question and write survey question, (2) plan how to record data and survey instrument,

(3) select sample, (4) observations, conduct interview, and record data, (5) enter data into computer, recheck all data and analysis data, (6) describe methods and findings in research report. Description of the research focus the android application was designed to be accessed offline, so that is independent of the internet once it has been downloaded into the mobile device. Android puzzle game Banten ancient mosque's is a local culture learning media innovation for early child cognitive development. The research place at RA Al Izzah Serang City, Banten Province Indonesia. The samples of this research were 30 kindergarten students (male were 20, female was 10). The data includes name, age, gender, intensity or interest in playing android puzzle games in one week. The indicator of questionaries of the research is show in Table 1.

Table 1. Questionnaires Indicator Conducted in The Field Experiment

Constructs	Indicator	Descriptions
Perceive usefulness (PU)	Satisfaction	1. I think android puzzle games useful to me 2. It would be comfortable for me to play android puzzle games 3. I find android puzzle games ABMs enjoyable and fascinating
Perceive ease of use (PEU)	Attitude	1. Playing android puzzle games ABMs does not require a lot of mental effort 2. I find android puzzle games easy to play 3. I find it easy to access and play android puzzle games when and where I want
Attitude Toward Using Technology (ATU)	Intension to use	1. Overall, I am satisfied with android puzzle games. 2. I am playing now meet my expectations 3. Android puzzle games was beneficial tool in improving my knowledge 4. It would be a wonder idea to play android puzzle games ABMs 5. I would have positive feelings toward android puzzle games in general 6. It is easier and better for me to play android puzzle games as opposed to other games 7. I intent to play android puzzle games much as possible 8. I intent to continue playing puzzle games. 9. I would rather play android puzzle games ABMs that other kinds of games

The main source were the data from the pre, and post test conducted that there were very good in perceive usefulness, ease of use, and attitude using technology. The data collected by using online questionnaire and observations. Technique of data analysis t was descriptive analysis (Creswell, 2013). Likert scale were the degree of agreement was determined as strongly disagree (1), disagree (2), moderately (3), agree (4), and strongly agree (5). Data collection and analysis, to obtain the data in line with purpose of the study, a measurement instrument consisting of three parts prepared in online google forms was used. In the first part of the measurement instrument was used validity and reliability. In the second part, the technology acceptance scale was used to determine the technology acceptance and use. Likert type scale was used. In the three parts, the scale has three sub dimensions, that is perceived usefulness (PU) 3 items, perceived ease to use (PEU) 3 items, and attitude toward using technology (ATU) 9 items. Data analysis using different statistical test.

3. RESULTS AND DISCUSSION

Results

Based on the theory above, the concept of the TAM approach includes perceived usefulness, being able to play comfortably, fun, and interesting. Perceived ease of use includes easy puzzle preparation, easy login, and being able to access puzzle games anywhere and anytime. There are 2 Attitudes Toward Using Technology (ATU), namely satisfaction, attitude, and intention to use. Satisfaction was able to play puzzle game, can play and win, android puzzle games Banten ancient mosque can improve my knowledge. Attitude was it would be a wonder idea to play android puzzle games Banten ancient mosque, have positive feelings. Intention to use were intent to play as much as possible, intent to continue playing, and android puzzle games is easy to play. The display of five puzzle game theme of Banten lama mosque's is show in Figure 1.

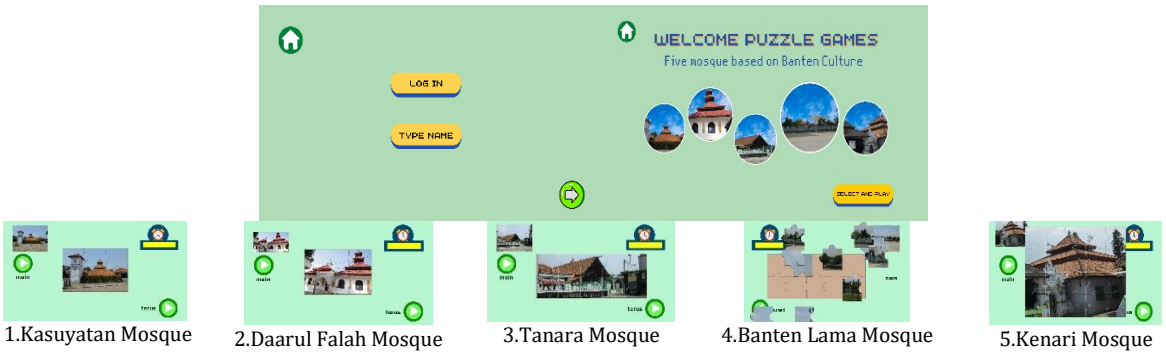

Figure 1. Five Puzzle Game Theme Banten Lama Mosque's

The reliability statistics used Cronbach's Alpha was R count 0,902 very high. So, all instruments were reliable. The validity statistics was sigma 0,004-0,009. It means all instruments were valid. There are differences in the cognitive development of children aged 5-6 years after using the application android puzzle game's theme Banten ancient mosques.

Table 2. Group Statistics Differences in Learning Outcomes by Gender

Value	Gender	N	Mean	Std. Deviation	Std. Error Mean
Score	Male	20	65.3500	5.79723	1.29630
	Female	10	63.6000	6.97933	2.20706

Parameters			Score	
			Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F		0.565	
	Sig.		0.459	
t-test for Equality of Means	T		0.729	0.684
	def.		28	15.412
	Sig. (2-tailed)		0.472	0.504
	Mean Difference		1.75000	1.75000
	Std. Error Difference		2.40195	2.55959
	95% Confidence Interval of the Difference	Lower	-3.17018	-3.69297
		Upper	6.67018	7.19297

Based on Table 2 show the results of data processing using the t test, a sig value of 0.472 was obtained, which was more than 0.05 (0.472 > 0.05). Then a decision can be obtained to accept Ho. This means that there is no difference in student learning outcomes in terms of gender (male and female). Group statistics differences in learning outcomes by age group is show in Table 3.

Table 3. Group Statistics Differences in Learning Outcomes by Age Group

Value	Age	N	Mean	Std. Deviation	Std. Error Mean
Score_1	5	12	63.8333	6.02771	1.74005
	6	18	65.3889	6.32585	1.49102

Parameters			Score_1	
			Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F		0.585	
	Sig.		0.451	
t-test for Equality of Means	T		-0.672	-0.679
	def.		28	24.527
	Sig. (2-tailed)		0.507	0.504
	Mean Difference		-1.55556	-1.55556
	Std. Error Difference		2.31449	2.29149
	95% Confidence Interval of the Difference	Lower	-6.29657	-6.27957
		Upper	3.18546	3.16846

Based Table 3 show the results of data processing using the t test, a sig value of 0.507 was obtained, which was more than 0.05 (0.472 > 0.05). So, a decision can be obtained to accept Ho. This means that there is no difference in student learning outcomes in terms of age range (5 years and 6 years).

Discussion

These puzzle games provide benefits for training language intelligence, mathematical logic intelligence, spatial visual intelligence, kinesthetics intelligence, musical intelligence, interpersonal intelligence, intrapersonal intelligence, religious intelligence (Armstrong, 2009; Thomar R., 2010). The intelligence of mathematical logic is to count the number of puzzles. Spatial visual intelligence, namely children can arrange mosque patterns correctly. Kinesthetics intelligence is the ability to drag and drop puzzle pieces precisely. Musical intelligence, that is, children can imitate the back sound in the android puzzle games application (Saputra & Ekawati, 2017; Wisnu Budi Wijaya, 2018). Interpersonal intelligence, namely children who are confident in using the puzzle games application system. Intrapersonal intelligence, namely children have good self-patience. There are 3 instruments, the ease of use of the puzzle games android application system (perceived usefulness). I can use the android puzzle game well, all the children agreed 71%. I am comfortable playing the Android puzzle games all respondents agreed 65%. In my opinion, android puzzle games are fun and interesting games, all respondents agreed 63%. This data is supported by the results of interviews with children, that they can use the login application system, play android puzzle games, and log out properly. Their game performance continues to improve up to level 3 (Khan & Vuopala, 2019; Surer, 2021). Conclusion android puzzle games can increase children's multiple intelligences, children's learning effectiveness, improve time efficiency in learning, and help children learn to read and count.

There are 3 easy-to-use tools for android puzzle games interface. Children easily understand the android puzzle games interface, all children answered that they agreed 65%. It's easy for children to use the android puzzle games interface, all children agree 70% of the time. Children can easily access and play the android puzzle games application interface, all children answered that they agreed 65%. The conclusion is easy for children to understand, easy to use, easy to become skilled at playing android puzzle games theme Banten ancient mosques (Abdullah et al., 2016; Huang et al., 2020). This puzzle game application uses the application package file (APK) format, which is a file format used to distribute and install software and middleware to android with the android operating system (Hernandez-Dominguez, 2022; N.Young, 2022). This application is easy to download and play by early childhood. Applications can also be accessed with various types of androids.

There are 9 instruments to measure the performance of using this android puzzle game. Children feel satisfied using android puzzle games 67%. Children feel satisfied playing and succeed according to expectations 67%. Children feel satisfied playing android puzzle games because it is beneficial to increase their knowledge by 67%. Children have an attitude to use android puzzle games actively 66%. Children have a positive attitude towards puzzle games ABMs 66%. Children are easier and more able to play puzzle games better than their opponents 65%. Children intend to continue playing puzzle games android 64%. Children prefer to play android puzzle games than other types of games 66%. Instrumental children intending to continue playing puzzle games had the lowest scores because teachers and parents limited the amount of time they played (Neteria et al., 2020; Pratamaa et al., 2023). The conclusion of the attitude of acceptance of android puzzle games technology in early childhood is very good. This is evidenced by children feeling satisfied as a positive feeling in learning, how to work, and this action provides benefits for early childhood cognitive development. This study also has limitations and strengths (Hermawan et al., 2017; Sari, N.T and Wasgito, 2020).

The limitations of this study: (1) android puzzle games do not yet have levels and scores of more than 3 levels, (2) the android puzzle games interface does not yet have time and score storage, (3) users of this android puzzle game are still limited to 30 children. The strengths of this android puzzle game with the theme of the ancient Banten mosque are: (1) functionally, this game can be played as a whole, (2) the game has been developed in terms of user experience, (3) the game has fulfilled the use ability aspect because researchers have carried out research with measurement of the TAM model approach, (4) the results of measuring the android puzzle game with the theme of the ancient mosque of Banten, effective as a learning medium for early childhood cognitive development.

4. CONCLUSION

Conclusion ease of use that users of the android puzzle games system are easy, according to the characteristics of the user's cognitive development. Confident children use this android system to improve their learning performance. Usefulness as a child's level of confidence or self-efficacy as a user can improve

their learning performance. Children's extrinsic motivation was triggered by android puzzle games so that learning productivity, problem solving performance can be carried out effectively. Attitude of using technology in terms of satisfaction, attitude, and intensity of using android applications is very good. The implication of the results of this study was that the android puzzle game can be used as a cognitive learning medium for children aged 5-6 years. Android puzzle game had an impact on children's learning motivation. Future researchers can develop an android puzzle game with the theme of other Banten local culture and wisdom.

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